



NASA's Launch Services Program
presents...

Soil Moisture Active-Passive SMAP

Launch Vehicle
Delta II 7320

Launch Location
Vandenberg Air Force Base, CA

Launch Date
December 2014 – January 2015

NASA's Soil Moisture Active-Passive, or SMAP, is a remote sensing mission designed to measure and map Earth's soil moisture distribution and freeze/thaw state with unprecedented accuracy, resolution, and coverage. Using a single satellite launched into a near-polar, low altitude orbit, SMAP's state-of-the-art radar and radiometer sensors are able to peer beneath clouds, vegetation, and other surface features to create global maps of these measurements every 2-3 days over a period of three years. Data from SMAP will be used in an extraordinary variety of important scientific applications and research, addressing weather forecasting and climate modeling, drought, flood and landslide predictions, agricultural productivity, and seasonal climate-related human health issues.

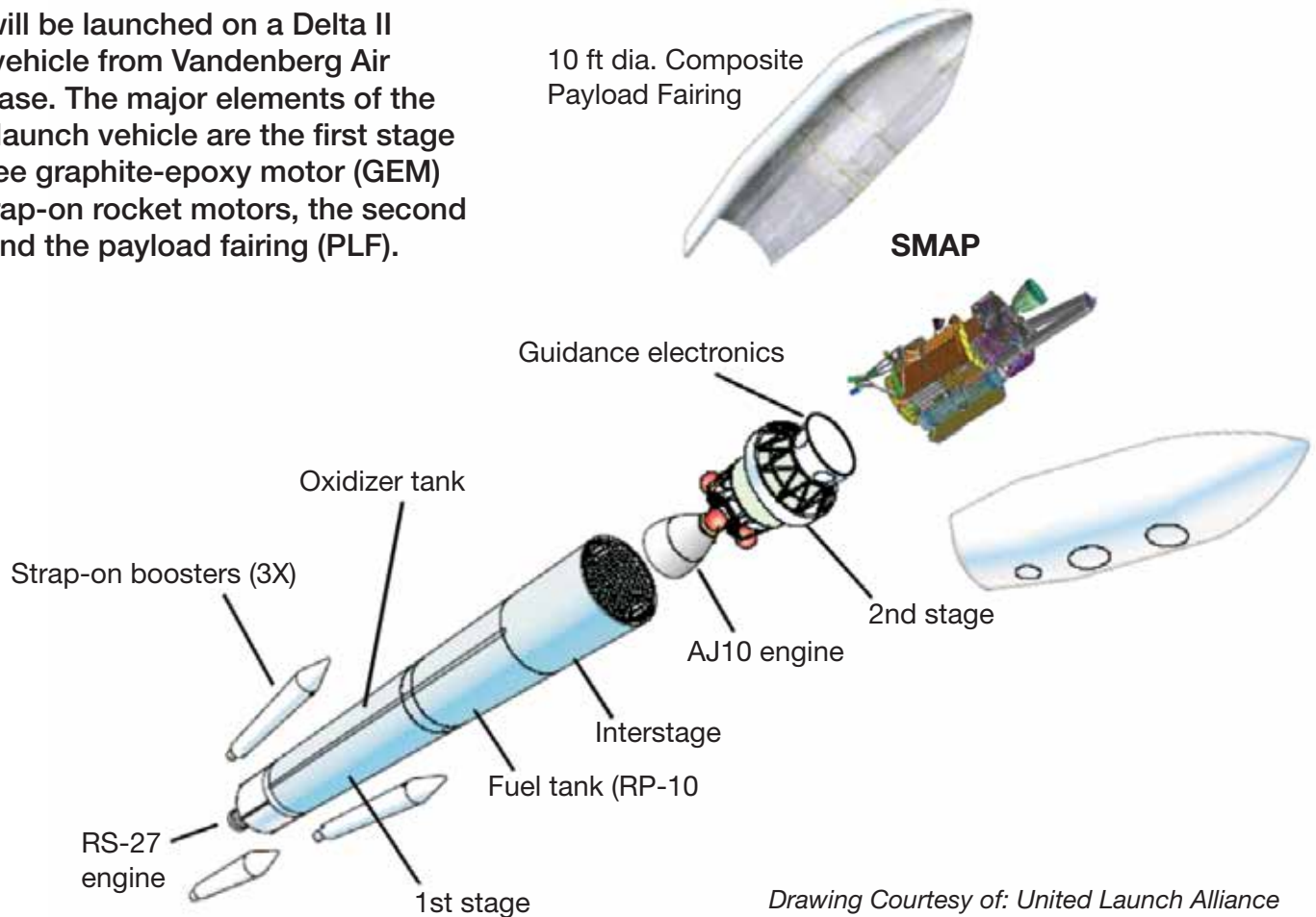
Soil moisture is a key environmental control affecting the evaporation and transpiration of water at the land-atmosphere boundary. Since large amounts of energy are required to vaporize water, soil moisture control also has a significant impact on the surface energy flux received from the sun. Thus, soil moisture variations affect the evolution of weather and climate, particularly over continental regions.

Recent computer model simulations of the effects of greenhouse gases on climate show that current models agree quite well in predicting temperature change but disagree significantly in predicting surface moisture change and water resource availability. Accurate soil moisture information provided from SMAP will be utilized to help improve the performance of numerical weather prediction models and seasonal climate models and enhance their predictive skill.

Soil moisture and its freeze/thaw state are also key determinants of the global carbon cycle. Carbon uptake and release in boreal landscapes (forested areas found mostly in the mid-northern latitudes of North America, Europe, and Asia) is one of the major sources of uncertainty in assessing the carbon budget of the Earth system (the so-called missing carbon sink). The SMAP mission will quantify the nature, extent, timing and duration of landscape seasonal freeze/thaw state transitions that are key to the estimation of terrestrial carbon sources and sinks, which in turn can help improve our understanding of how the global carbon cycle affects long-term climate behavior.

Soil Moisture Active-Passive (SMAP)

SMAP will be launched on a Delta II launch vehicle from Vandenberg Air Force Base. The major elements of the Delta II launch vehicle are the first stage with three graphite-epoxy motor (GEM) solid strap-on rocket motors, the second stage, and the payload fairing (PLF).



The SMAP instrument includes a radiometer and a synthetic aperture radar operating in the L-band (1.20-1.41 GHz). The instrument is designed to make coincident measurements of surface emission and backscatter, with the ability to sense the soil conditions through moderate vegetation cover. The instrument measurements will be analyzed to yield estimates of soil moisture and freeze/thaw state.

SMAP science measurements will be acquired for a period of three years. A comprehensive validation program will be carried out after launch to assess the accuracies of the soil moisture and freeze/thaw estimates.

